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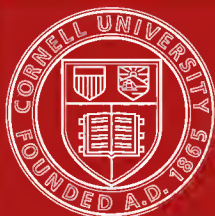
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# Lehigh Valley Railroad Company

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BULLETIN No. 1  
(Third Edition)

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## How to Grow Alfalfa in the East



Issued by Industrial Department  
143 Liberty Street, New York, N. Y.

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## **Lehigh Valley Railroad**

143 Liberty Street  
New York

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### **INDUSTRIAL DEPARTMENT**

P. H. Burnett, Industrial Commissioner, 143 Liberty Street, New York  
F. R. Stevens, Agriculturist, Geneva, N. Y., and  
228 So. Third Street, Philadelphia, Pa.

# HOW TO GROW ALFALFA IN THE EAST

**I**NTEREST in alfalfa continues to increase, as it well deserves to. It has a place on every farm on our line. It solves the feeding problem. Five tons of alfalfa per acre gives 1,560 pounds of protein, two tons of timothy per acre gives 272 pounds protein.

It solves the hay problem. Four to five tons of alfalfa may be grown to the acre as in comparison to one and one-half to two tons of timothy and it is worth more per ton.

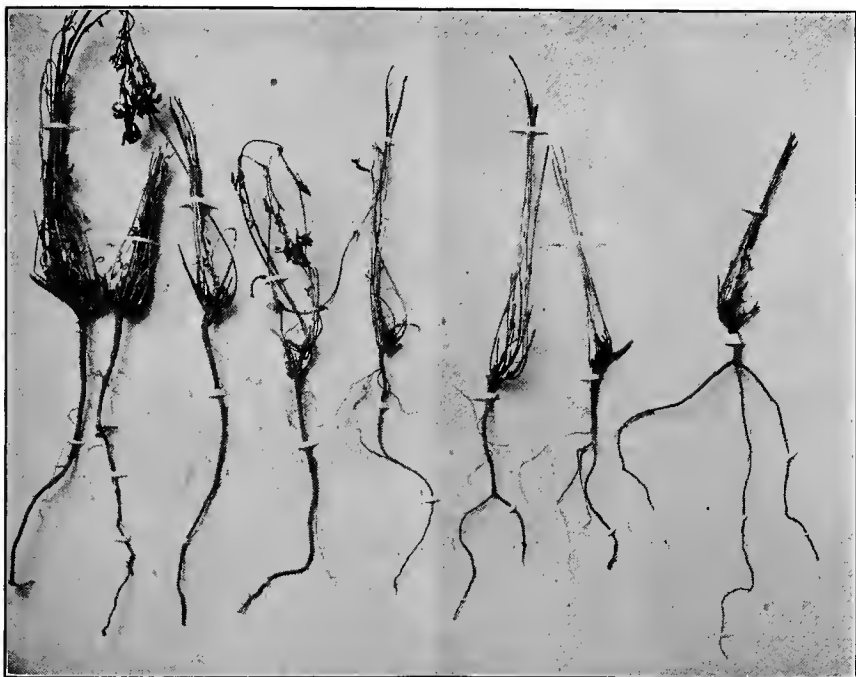


Fig. 1—Yearling roots from a field of ordinary Alfalfa, seeded twenty pounds per acre.

It helps to solve the fertilizer problem. Two fields treated alike except one being heavy alfalfa sod and the other timothy sod, yielded as follows:

#	1900 Wheat	1902 Barley	1903 Com.
Alfalfa sod.....	61.5 bu.	30.2 bu.	24. bu.
Timothy sod.....	42.1 "	19.7 "	17.9 "

During the past three years we have made strenuous efforts to grow alfalfa upon that portion of the territory along our line which is naturally not adapted to the tap rooted variety which is in common use throughout the East. All that

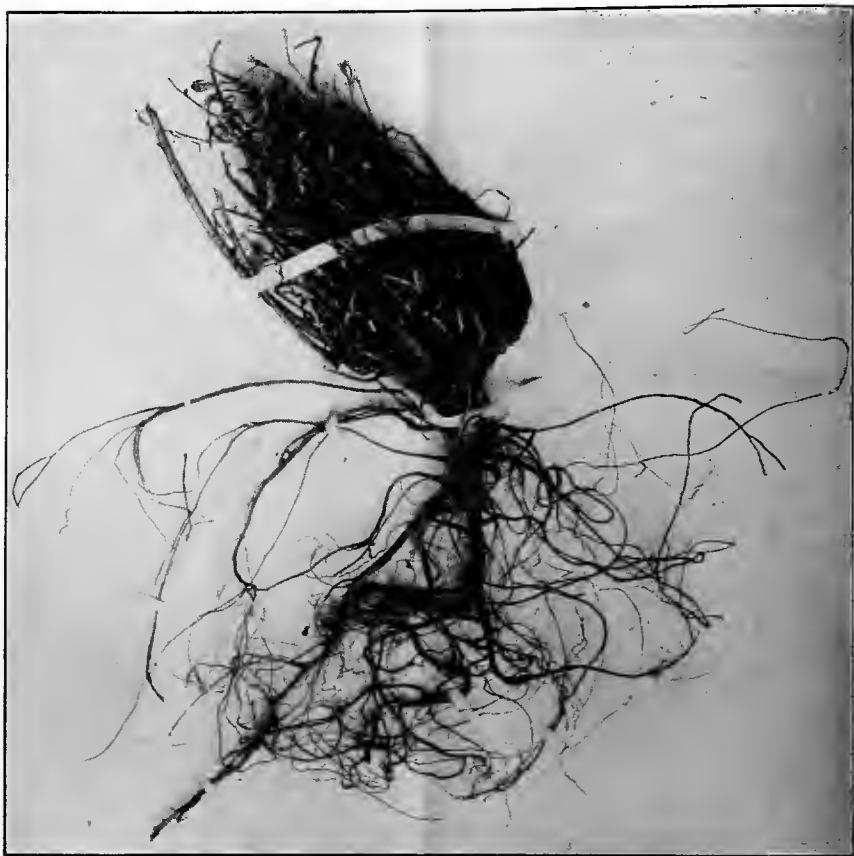


Fig. 2—Typical Grimm Alfalfa plant, two years from seeding.

portion of our road lying West of Burdett, including the A. & I. Division, with the exception of a few unfavorable spots, are naturally adapted to the growing of common alfalfa, and in these sections its use has spread decidedly and is gaining more and more favor among our farmers as their principal forage crop. The progress in these sections has been entirely satisfactory.

Our greatest difficulty seems to be the growing of this crop on soils which naturally have a wet subsoil and heave or throw out the tap rooted plant during the spring of the year. Until within the past few years, little attention has been given to the question of alfalfa varieties in the East. The type of seed in com-



mon use is not true to any well-defined variety. The result of using this seed indiscriminately has been a total failure of the crop in many sections, due largely to heaving.

Figure one shows eight yearling plants taken from a field seeded with the so-called Common Variety. You will note that five of these plants have simply a straight tap root with small, weak lateral roots; two have a slight tendency to branch; and one has a decided tendency to branch. In short, common alfalfa is not true to any type. This last accounts for the condition that where a field of alfalfa has been heaved out, occasionally a plant is found in the field which did not heave. An examination of the roots of this surviving plant would show that it was of the branching root variety. This so-called common variety with the straight tap root has a value above all other varieties in that it will go very deep into the soil for water, and so avoid drought, and in types of soil which are deep and well drained, where there is little heaving, no better variety could be found, provided it is grown well North so as to be hardy.

We became convinced that in order to grow alfalfa upon heavy soils we must use the spreading root varieties, the seed of which was very scarce and expensive.



Fig. 3—David Harum farm, Homer, N. Y. Grimm alfalfa, five pounds to the acre seeded broadcast, on volusia silt soil. Yield  $4\frac{1}{2}$  tons per acre. Seeded in 1913.

In order to facilitate the growing of alfalfa on the hardpan volusia silt soils, our railroad in 1913 distributed a small amount of seed to each of about fifty farmers who owned hardpan land and were anxious to grow alfalfa. For this purpose the

Grimm alfalfa was selected, figure two showing a typical two-year old Grimm plant with the spreading root which holds it in hardpan soils. This seed was to be put out in plats twenty-eight inches apart, for the purpose of producing seed. Without an exception, these plats were successful, although put out under most adverse conditions there was no report that there was any considerable heaving in any one of them. In several cases most successful crops of seed were taken, sufficient

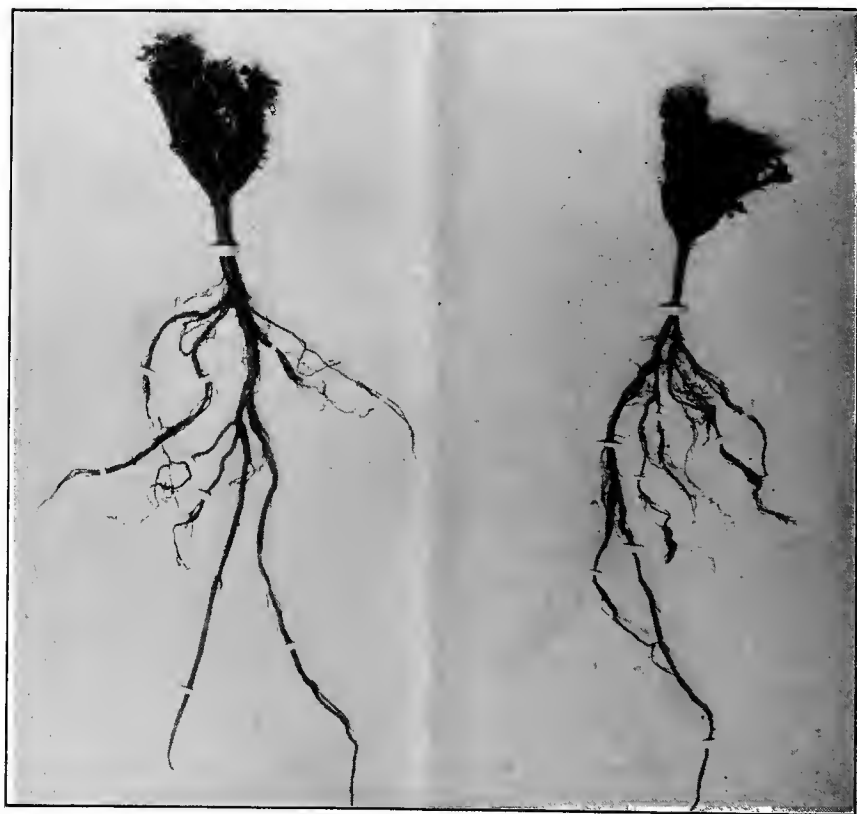


Fig. 4—Baltic Alfalfa.

in at least four cases to seed ten acres. In addition to this, some of our farmers purchased the seed, even when the price was at that time a dollar a pound, and seeded this Grimm variety as a meadow.

Figure three shows the picture of such a meadow seeded in 1913 on volusia silt soil which yielded four and one-half tons per acre and on which there was no heaving, although the ordinary variety heaved out on an adjoining field.

Figure four shows the type of Baltic alfalfa, which although it has a tap root, also has heavy laterals thus giving it a more hardy growth and the ability to penetrate more deeply into the soil after water.<sup>1</sup>

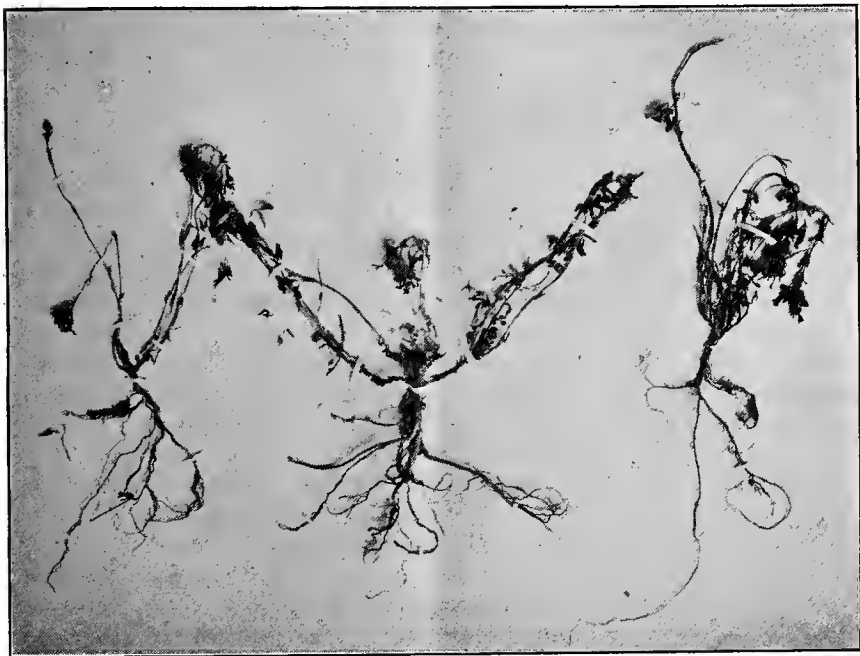


Fig. 5—"Lehigh Alfalfa." A Falcata variety, from a plant found on the right of way of our railroad.

Figure five is an interesting plant grown from a seedling found on the right-of-way of our railroad. You will note that the root is a spreading type entirely, and that the branches start beneath the surface of the ground, running under the ground like a quack root and appear some distance from the main plant. We are developing this into a pasture alfalfa because budding as it does beneath the ground there is no opportunity for the hoofs of the animals to break the crown and so destroy it.

With this added information in the matter of varieties of alfalfa we are prepared now to state that alfalfa can be grown successfully on any soil which does not lie under water any portion of the year and which has a depth of eight inches or more above hardpan or rock.

<sup>1</sup>Alfalfas are divided botanically into three groups:

*Medicago Sativa* (the ordinary tap root varieties).

*Medicago Falcata* (spreading and tap root), the one noted above.

*Medicago Media* (crosses between the above), Grimm, Baltic, Variegated, etc.

**Humus** The soil should have a large amount of decomposed vegetable matter. This is best obtained by plowing under from twelve to fifteen loads of stable manure or a large crop of Canadian field peas per acre. It may be obtained also by plowing under a sod, but in such cases it seems advisable to follow this with potatoes, corn or other crops which will be kept free from weeds and then follow this crop with alfalfa. However, if it is highly desirable to seed immediately to alfalfa make sure that the furrows are not completely inverted and then disk several times to thoroughly grind up the sod.

**Lime** Alfalfa must have plenty of lime for two reasons. First, because it needs lime as a food. Second, because alfalfa has that power in common with the clovers of feeding on the free nitrogen of the air through the aid of bacteria which gathers on the roots forming little balls or nodules. These bacteria flourish best in the presence of lime. Apply lime immediately after plowing. This should be spread broadcast. If the field is of limestone formation, 1,500 pounds of quick lime (or its approximate equivalent 3,000 pounds of slaked lime or ground limestone) is sufficient. If not of limestone formation double this quantity.

**Inoculation** Extensive experiments have proved that comparatively few of our Eastern soils contain the bacteria necessary for the growth of this plant, and, as the amount of bacteria carried by the seed is very small, it is usually necessary to artificially inoculate the soils before seeding. This may be done by taking 150 to 200 pounds of soil from just below the surface of a thrifty alfalfa field and scattering over the surface of the proposed alfalfa field at any time after liming and before seeding. Harrow this inoculating soil immediately after spreading. During the past three or four years the manufacturers of alfalfa cultures have so improved the quality of their material that it may be depended upon entirely for the inoculating of seed by following directions. The New York State College of Agriculture at Ithaca, N. Y., is sending to its farmers, at cost, cultures of inoculation, and it is not advisable to seed any field with alfalfa, even in the alfalfa sections, without inoculating the seed for safety.

**Seed** Much difficulty has been experienced in the past in securing good seed, and, while in general, the quality is improving, the only safe way is to secure in advance a sample of seed from your dealer and forward it to your Experiment Station for examination. Where the common alfalfa is used, seed at the rate of fifteen to twenty pounds per acre, and where the Grimm is used, five to eight pounds per acre is sufficient. The condition of tillage will determine the amount of seed required. With an extra fine seed bed and the seed covered at the proper distance the minimum amount of seed named here is amply sufficient. This seed may be either sown broadcast or in drills eight inches apart, care being taken that in no case the seed be seeded more than one-fourth of an inch deep.

**Time of Seeding** Alfalfa in the East may be seeded from May 15th to June 15th. Common alfalfa may be seeded in August, but the Grimm should be seeded always in the spring, thus giving it an opportunity to develop its lateral roots before the first winter. Nurse crops may be used, provided they are cut green and not allowed to mature on the ground. Alfalfa may be seeded with peas, grown for the canning factory, with a bushel of barley or a bushel of oats, provided the latter are cut for hay. In exceptional years of good moisture successes have been known seeded with wheat or even oats which were allowed to mature, but there is more often failure than success in this way.

**Fertilizer** Alfalfa responds readily to the mineral fertilizers, potash and phosphorus. It responds especially to phosphorus, although potash shows most excellent results on light soils. Our most successful growers have the practise of using 500 pounds of acid phosphate at the time of seeding and top dressing with 200 pounds per acre every second year.

**Tillage** One of the greatest enemies of alfalfa is weeds. For this reason never use manure as a top dressing of alfalfa. At least once every year, harrow with a spring tooth harrow with the diamond points or with one which has had the teeth sharpened especially to be used simply as an alfalfa harrow. In cases of well drained soil, this harrowing may take place before the alfalfa starts in the spring. Wherever the horses will damage the ground before the alfalfa starts, let the harrowing take place after the first cutting. Where the seeding has been done in drills a much more effective harrowing may be made by running lengthwise of the drill marks. If the seeding has been broadcast, harrow both ways. Under no conditions use a disk harrow on alfalfa in our Eastern climate.

**Harvesting** The guide to the time for harvesting should be the starting of the young shoots at the crown of the plant. When they appear, cut immediately paying no attention to the blossom. During the past two or three years these young shoots have appeared ten days or two weeks ahead of the blossom. Use a hay tedder immediately behind the mowing machine, but not after the alfalfa has dried. In the matter of curing, we have two systems in the East both of which are a success. In one case the hay is put into large cocks and covered with caps. These may be made from ordinary seven cent muslin, of which a half width is sewed to the side, making a cap  $4\frac{1}{2}$  by  $4\frac{1}{2}$  feet. Hem on both sides, and in the corners punch ordinary brass eyelets, then, by cutting old fence wire three feet long and doubling in the form of a hairpin, the caps may be very quickly and securely fastened to the hay cock. In other cases, the side delivery rakes are used, and the alfalfa thrown into large windrows, in some cases a double windrow, turned over once and then carried to the stack or to the barn with a bull rake or loaded by means of a hay loader. Figure six shows a bull rake in use on one of the farms along the line of our road which has one hundred acres in alfalfa. The hay loader,



Fig. 6—Harvesting a hundred acre field of alfalfa at Honeoye Falls, N. Y., on the farm of E. F. Dibble.

of course, being very convenient where the alfalfa is to be put into the barn. A better quality of hay is secured when cured in the cock. In this case a real curing instead of a drying is secured. Alfalfa is often damaged by being cut so late in the fall that growth does not again start before heavy frosts. In our territory October 1st seems to be the latest date which alfalfa can be safely cut.

**Pasture** It is unwise to pasture alfalfa in our climate except with hogs. During very dry weather the Falcata variety may be pastured generally, especially with mature fields, but it is only on rare occasions that a field of ordinary variety of alfalfa may be pastured with horses and cows.

**Diseases** Alfalfa is not very susceptible to ordinary plant diseases. If affected for any cause, either lack of lime, inoculation, phosphorus or otherwise, alfalfa turns yellow and black spots appear on the leaf. This is a plant disease, but the remedy lies more in strengthening the alfalfa. Applications of lime or phosphorus will help with this, but it may be due to a drought which cannot be avoided. Another disease, apparently more serious was found by us during the past spring and as yet our Plant Pathologists at the Experiment Station are working upon it and we hope to be able to give a remedy.

This disease shows itself in a narrow band about the root, usually close to the crown in which the living part of the root is entirely decayed, thus destroying the plant.

**Insects**      The insect most troublesome to alfalfa is the Clover Root Curculio which in years of drought has done great damage. In some cases of new seeding they have completely ruined fields. Early in the year in the grub form these insects work upon the root making long marks through the growing part of the cambium layer. Later in the fall in the form of a beetle they appear upon the leaves and in the case of young plants seeded in August often cut the stalk completely off. Arsenic sprays, where there is no danger from animals, may be used late in the fall. No danger from this will be experienced the following spring.

**Dodder**      Dodder is still to be found in some seed. This appears in the form of a small host plant in appearance like corn silk which encircles and kills out the alfalfa in spots. The only remedy is to dig deep, burning all vegetable matter in the area and well outside of the infected part. Burn over the spot carefully with straw, and reseed.

**Uses of Alfalfa**      Alfalfa is a most excellent feed for horses, the cut or ground alfalfa, of course, being preferable. For cows it is becoming the standard roughage and is eagerly sought after as an economical roughage and always recommended for cows under test. Alfalfa hay and silage alone form a balanced ration, although concentrates may be added to advantage. Horses may be fed alfalfa to great advantage. Working horses when fed alfalfa as a roughage maintain their physical condition on less grain and no harmful effects result, effecting a saving of 22 per cent. in cost of feed (Note 1). The experience of the L. V. Coal Co. in feeding mules in the mines was a saving of 25 per cent. It has been found that corn is the grain that can best be used in this connection for working horses.

**Hay**      The demand for alfalfa in the general market as a hay is constantly increasing. Alfalfa from California is being purchased in New York and New Jersey because of the lack of supply in the East. The price has constantly risen until now it is from one to three dollars higher than timothy, per ton. As the value of this hay becomes known, this demand will undoubtedly increase and the demand for timothy decrease accordingly. This is a matter of encouragement to the farmers of the East, because in the case of alfalfa, hay may be sold from the farm without detriment to the fertility of the soil.

**Seed Production in the East** It is a well known fact that alfalfa seeds in the East only during a drought. For this reason, a very severe drought is necessary in order to produce seed from the long-rooted varieties. However, the spreading root variety seeds quite readily under our conditions and promises a profitable industry here. Practically all of the new varieties are expensive, and



Fig. 7—Grimm alfalfa in rows for seed production.

I suggest that those who cannot afford to seed a large area because of the high price of the seed, purchase a small amount and put it in rows, as given in Figure seven, twenty-eight inches apart, which may be used as a source of seed for many years to come. Two pounds of seed will usually seed an acre, in this way. This seed should not be more than two or three seeds to the linear inch and may be seeded with a hand drill, after the ground has been prepared as described above for alfalfa.













